

What is claimed is:

- 1 1. A detection circuit for indicating a blown state or un-blown state of a fuse under
2 detection, comprising:
 - 3 a fuse detection circuit part having a fuse under detection, the fuse detection circuit part
4 producing a fuse detection voltage corresponding to a detection current in the fuse under
5 detection;
 - 6 a reference circuit part for generating a reference voltage, the reference circuit part having a
7 reference fuse substantially identical to the fuse under detection in its un-blown state; and
8 the reference voltage being between a fuse detection voltage corresponding to an un-blown state
9 of the fuse under detection and a fuse detection voltage corresponding to a blown state of the
10 fuse under detection, thereby distinguishing the blown state from the un-blown state.
- 1 2. The detection circuit of claim 1, wherein
2 the reference circuit part and the fuse detection circuit part having respective transistors for
3 receiving a fuse detection enable signal.
- 1 3. The detection circuit of claim 1, wherein
2 the reference circuit part producing a bias voltage that is supplied to the fuse detection circuit
3 part.
- 1 4. The detection circuit of claim 1, wherein
2 the reference fuse and the fuse under detection having substantially the same layout on a circuit
3 board.
- 1 5. The detection circuit of claim 1, wherein
2 a current mirror having a first current mirror transistor in the reference circuit part connected to a
3 second current mirror transistor in the fuse detection circuit part; and
4 the second current mirror transistor being smaller than the first current mirror.
- 1 6. The detection circuit of claim 5, wherein

2 the reference circuit part and the fuse detection circuit part having respective transistors
3 receiving a fuse detection enable signal.

1 7. The detection circuit of claim 5, wherein
2 the first current mirror transistor supplying a bias voltage to the second current mirror transistor.

1 8. The detection circuit of claim 5, wherein
2 the reference fuse and the fuse under detection having substantially the same layout on a circuit
3 board.

1 9. The detection circuit of claim 5, further comprising:
2 a comparator for comparing the reference voltage and the fuse detection voltage.

1 10. A circuit, comprising:
2 one or more fuse detection circuit parts each having a fuse under detection;
3 a reference circuit part having a reference fuse identical to each fuse under detection in their un-
4 blown states;
5 the reference circuit part and each of the fuse detection circuit parts having respective current
6 mirror transistors; and
7 the current mirror transistor in each of the fuse detection parts being smaller than the current
8 mirror transistor in the reference circuit part.

1 11. The detection circuit of claim 10, wherein
2 the reference fuse and each fuse under detection having substantially the same layout on a circuit
3 board.

1 12. The detection circuit of claim 10, further comprising:
2 each fuse detection circuit part producing a fuse detection voltage; and
3 each fuse detection circuit part having a comparator comparing the fuse detection voltage with a
4 reference voltage produced by the reference circuit part.

1 13. A detection circuit for indicating a blown state or an un-blown state of a programmable
2 fuse under detection, comprising:

3 a fuse detection circuit part having a fuse under detection;

4 a reference circuit part having a reference fuse substantially identical to the fuse under detection
5 in its un-blown state; and

6 a comparator for comparing a reference voltage in the reference circuit part and a fuse detection
7 voltage in the fuse detection circuit part to determine whether the fuse under detection is blown
8 or un-blown.

1 14. The detection circuit of claim 13, further comprising:

2 a first current mirror transistor of the reference circuit part for generating a bias voltage;

3 a second current mirror transistor in the fuse detection circuit part for receiving the bias voltage,
4 the second current mirror transistor being smaller relative to the first current transistor for the
5 reference voltage to be between a fuse detection voltage of an un-blown fuse under detection and
6 a fuse detection voltage of a blown fuse under detection, thereby distinguishing a blown state
7 from an un-blown state by comparison with the reference voltage.

1 15. The detection circuit of claim 13, wherein

2 the reference circuit part and the fuse detection circuit part having respective transistors
3 receiving a fuse detection enable signal.

1 16. The detection circuit of claim 13, wherein

2 the reference circuit part producing a bias voltage that is supplied to the fuse detection circuit
3 part.

1 17. The detection circuit of claim 13, further comprising:

2 the reference fuse and the fuse under detection having substantially the same layout on a circuit
3 board.

1 18. A method of detecting a blown state or un-blown state of a fuse under detection,
2 comprising:

3 generating a fuse detection voltage in a fuse detection circuit part, the fuse detection circuit part
4 having the fuse under detection;

5 generating a reference voltage in a reference circuit part, the reference circuit part having a
6 reference fuse substantially identical to the fuse under detection in its un-blown state; and

7 comparing the reference voltage and the fuse detection voltage to determine whether the fuse
8 under detection is blown or un-blown.

1 19. The method as recited in claim 18, further comprising:

2 generating a bias voltage in a first current mirror transistor of the reference circuit part;

3 supplying the bias voltage to a second current mirror transistor in the fuse detection circuit part,
4 the second current mirror transistor being smaller relative to the first current transistor for the
5 reference voltage to be between a fuse detection voltage of an un-blown fuse under detection and
6 a fuse detection voltage of a blown fuse under detection, thereby distinguishing a blown state of
7 the fuse under detection from an un-blown state of the fuse under detection by comparison with
8 the reference voltage.

1 20. A method of making a fuse detection circuit, comprising:

2 fabricating a fuse detection circuit part having a fuse under detection;

3 fabricating a reference circuit part having a reference fuse identical to the fuse under detection in
4 its un-blown state; and

5 fabricating a comparator for comparing a reference voltage in the reference circuit part with a
6 voltage in the fuse detection circuit part to determine whether the fuse under detection is blown
7 or un-blown.

1 21. The method as recited in claim 20, further comprising:

2 manufacturing the reference fuse and the fuse under detection with substantially the same
3 manufacturing process steps.

1 22. The method as recited in claim 20, further comprising:

- 2 manufacturing the reference fuse and the fuse under detection with substantially the same layout
- 3 on a circuit board.